NAVAL HEALTH RESEARCH CENTER

Internet-based Injury Profile Developer (IPD)
User's Manual
Version 1.0

M. Knapp

M. Galarneau

P. Kizakevic

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NAVAL HEALTH RESEARCH CENTER
P. O. BOX 85122
SAN DIEGO, CA 92186-5122

BUREAU OF MEDICINE AND SURGERY (M2)
2300 E ST. NW
WASHINGTON , DC 20372-5300

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Matthew Knapp[1]

Mike Galarneau[1]

Paul Kizakevich[2]

[1]**Naval Health Research Center**
P.O. Box 85122
San Diego, CA 92182-5122

[2]**Research Triangle Institute**
P.O. Box 12194
Research Triangle Park, NC 27709-2194

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Summary

The fundamental effectiveness of any modeling and simulation projection tool is dependent upon the quality of the underlying data. The Naval Health Research Center has historically used three primary sources of data to support its projection tools. These include historical analysis of past events and archival records, the scientific literature, and Subject Matter Experts (SMEs). The third data source, SMEs, is used when the data are unavailable either historically or in the scientific literature. In these circumstances, SMEs are assembled, and a particular area of knowledge is discussed by the group. The primary objective of these efforts is to extract knowledge from the collective body of training and experience of the SMEs, and to reach consensus on the discussion issues. These consensus-based subject areas are then organized into databases, and incorporated into projection tools. This process, however, is time-consuming and costly. The current study was undertaken to address this issue.

In an effort to develop a more efficient SME consensus-building approach, an Internet-based application was developed that would preclude the necessity of gathering SMEs in a single location to collect required data sets. In this approach, an application, named the Injury Profile Developer (IPD), was created. The IPD was created to allow SMEs to sign-on to a PC at a time and place of their choosing. In this application, users are presented with a description of a simulated combat casualty, and asked to administer simulated field-level treatments, adjust casualty signs, and symptoms, and project probabilities of survival at five simulated points in time along a 12-hour continuum of time. To assist SMEs in the use of the IPD, a user's guide describing the application and how to use it was prepared.

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Introduction and Background

The Injury Profile Developer (IPD) is a software tool used by the Naval Health Research Center (NHRC) to collect data from you, the subject matter expert (SME). It allows SMEs to give expert opinions on the status of patients at varying points in time after suffering an injury and to project what supplies and procedures would be necessary to treat that injury.

One valuable aspect of the IPD is that it standardizes the data collection process for both the NHRC and SMEs. This way, whenever researchers at NHRC desire your opinion on a patient injury or disease, you will know right where to find the Web site and exactly how to enter the appropriate information. Depending on the complexity of treating a disease or injury, it will take about 10 to 20 minutes to complete each scenario.

The IPD is part of a larger program under way at NHRC. The goal of this program is to provide the Navy and Marine Corps with the most accurate and up-to-date estimates of casualty rates for different peacetime and wartime scenarios. Using these casualty estimates, NHRC determines what medical supplies and procedures will be needed to treat American troops in different parts of the world for different types of military actions.

The following is a list of a few terms used in the manual:

Case – Each time an individual enters data for a different scenario is a case. A unique case number will be assigned in each instance.

Form – A scenario that contains data entered by a subject matter expert, whether complete or incomplete.

Scene – A hypothetical injury situation for which NHRC would like to collect data.

Student or **Subject Matter Expert (SME)** – An individual who provides data through the IPD.

There are two sections to the IPD User's Manual, the User's Guide and the Administrator's Guide. Administrators are strongly encouraged to read through the User's Guide and practice using the IPD prior to engaging in any administrative functions.

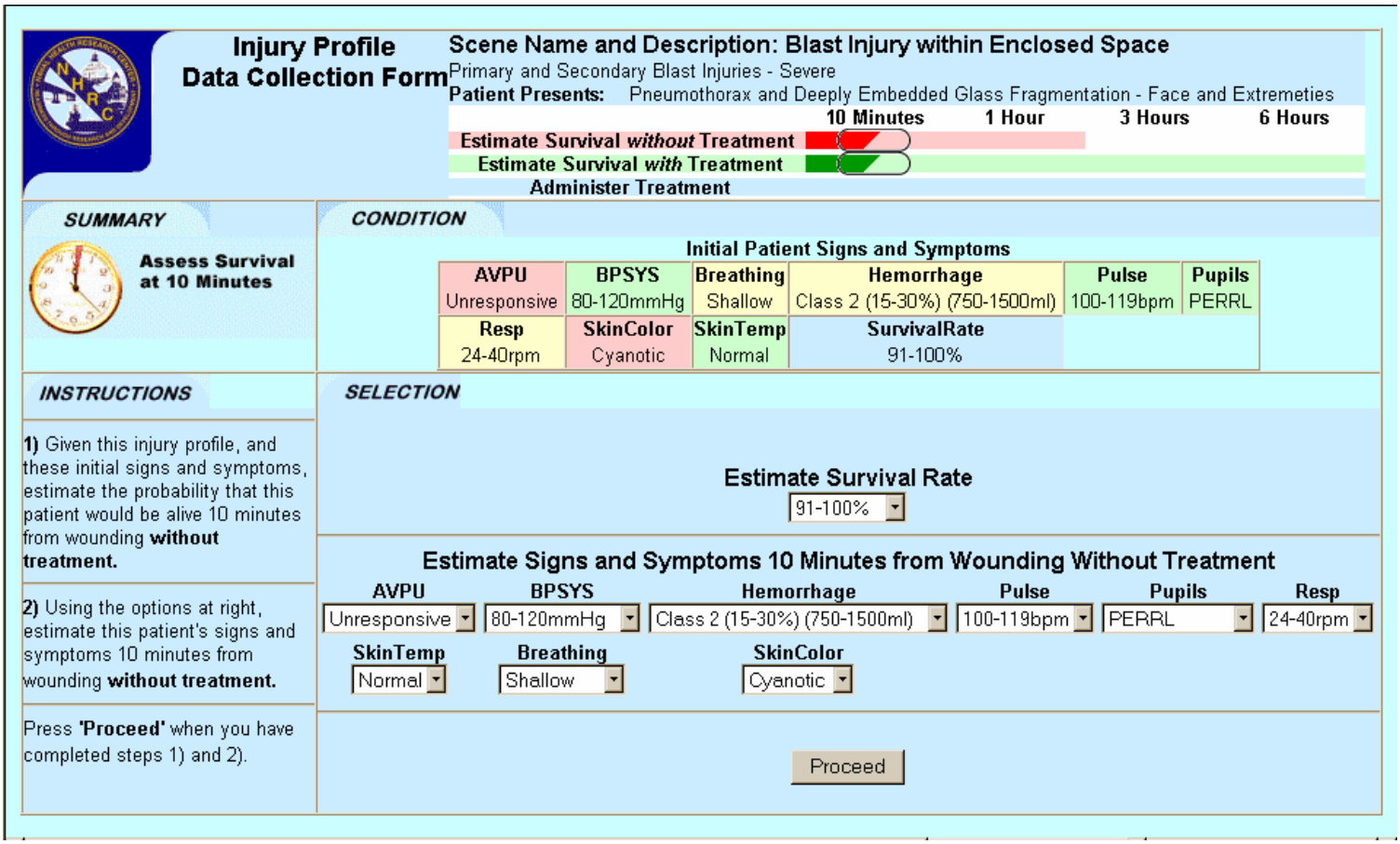
USER'S GUIDE

To access the IPD, go to http://nhrc-iat.rti.org/. At the bottom of the page, you will be asked to enter some demographic information. Please provide as much information as possible. From there, you can proceed to a page that allows you to choose the disease/injury scenario for which you would like to enter data.

The IPD requires that you enter patient condition and treatment information in a series of point-and-click style screens. Each scenario has nine screens and each screen has one of two primary functions – either to gauge your opinion of a patient's likely condition or to get your input on what treatments would be necessary to care for that patient.

A more detailed account of what you will see on each screen follows:

SCREEN 1: Patient Condition at 10 Minutes, Without Treatment



This is the first of two basic screen layouts that you will see in the IPD. Its purpose is to gauge your opinion of the patient's condition 10 minutes after the injury has occurred. The screen contains a basic description of the injury and the patient's presenting signs and symptoms.

The section labeled "Condition" will be present on every screen, and it changes based on the data entered on the previous screen. Each symptom is color-coded to provide an overall view of the patient's condition: green cells indicate acceptable levels, yellow cells indicate cautionary levels, and red cells indicate dangerous levels. The "Survival Rate" cell always remains blue and is not subject to the color-coding system.

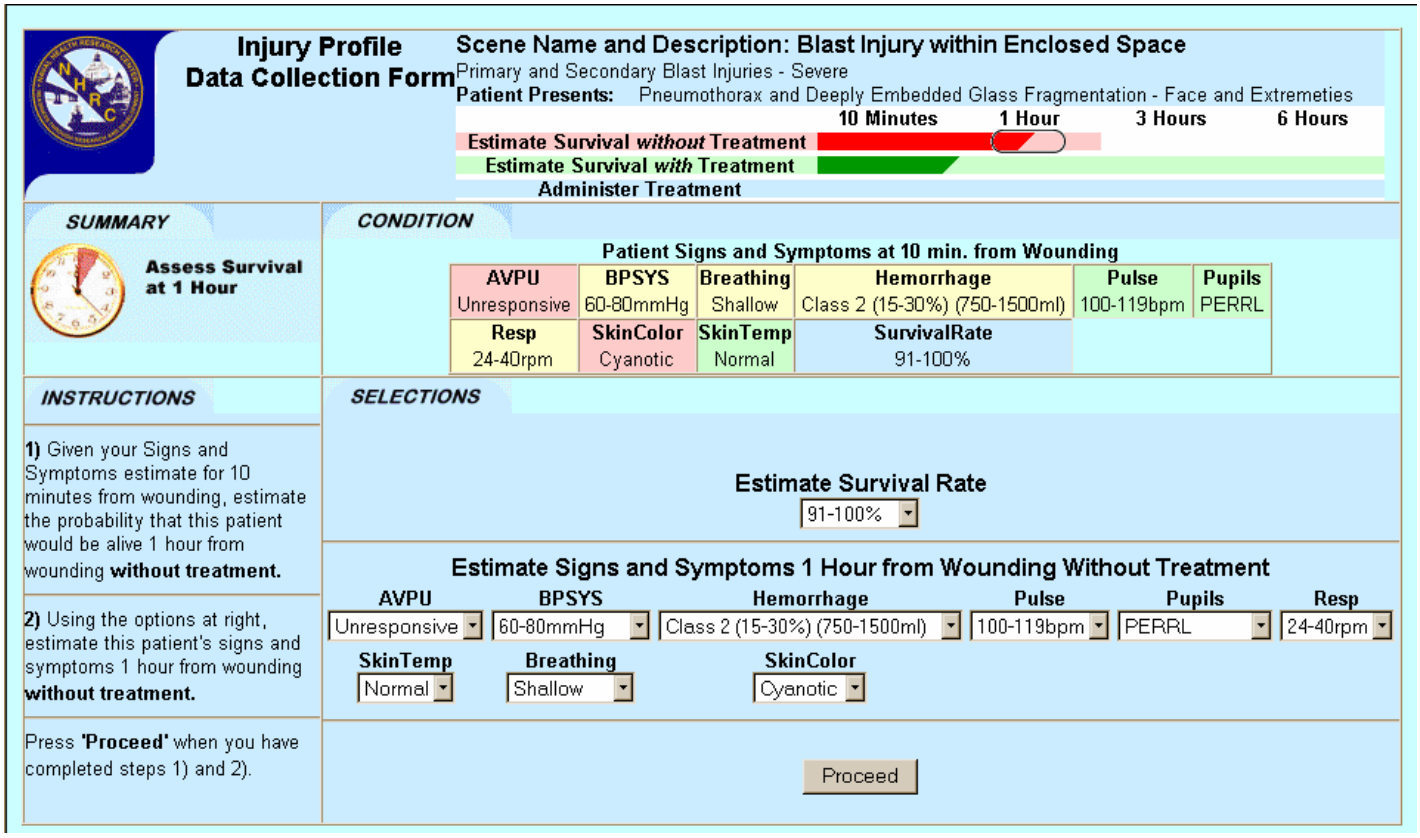
After getting an overview of the patient's condition, the next step is to estimate the patient's likelihood for survival. Given that survivability can depend on many factors, all that is asked of you is that you provide your best estimate based on the information available.

The final step on this screen is to provide your estimates for patient signs and symptoms 10 minutes after injury. Each sign or symptom contains a drop-down menu for you to choose from with the following values:

Survival Rate	AVPU	BPSYS (mmHg)	Hemorrhage	Pulse (bpm)	Pupils	Resp (rpm)	Skin Temp	Breathing	Skin Color
0-10%	Alert	<60	None	<40	PERRL	<10	Normal	Normal	Normal
11-25%	Verbal	60-80	Class 1 (<15%)	40-59	Dilated	10-23	Cool	Labored	Pale
26-50%	Pain	80-120	Class 2 (15-30%)	60-99	Constricted	24-40	Hot	Distressed	Flushed
51-75%	Un-responsive	120-150	Class 3 (30-40%)	100-119	Unequal	>40		Shallow	Jaundice
76-90%		>150	Class 4 (>40%)	120-139	Non-Reactive			Agonal	Cyanotic
91-100%				>140					

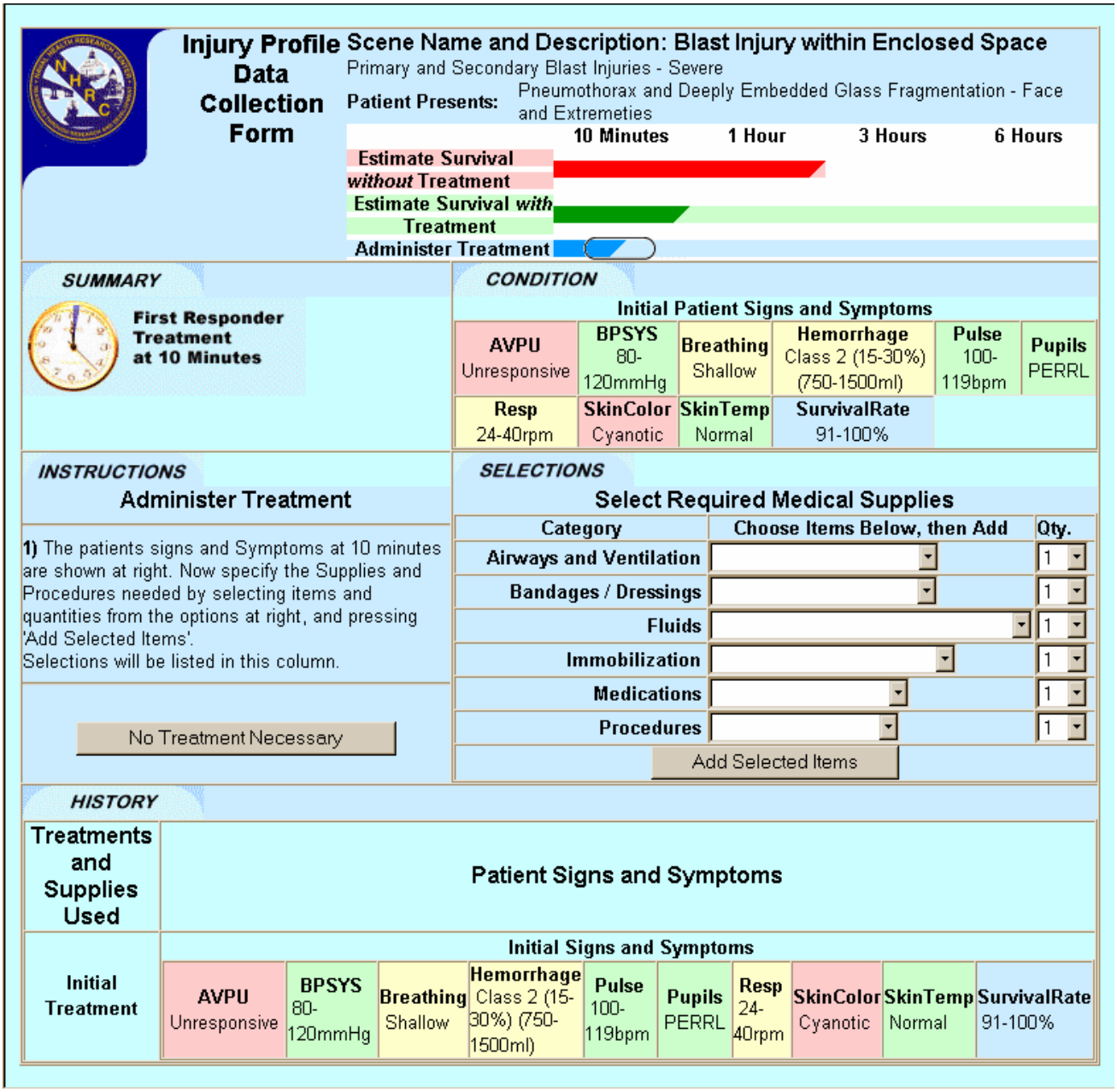
These values remain the same throughout the IPD and can be chosen in any desired combination. Once you have set the signs and symptom values to the settings you wish, click on the **"Proceed"** button and you will be taken to Screen 2.

SCREEN 2: Patient Condition at 1 Hour, Without Treatment



Screen 2 looks almost exactly the same as Screen 1, but it will contain the patient signs and symptoms that you entered on Screen 1. Screen 2 requires you to again estimate the patient survival rate and signs and symptoms, but at 1 hour after injury instead of 10 minutes. After you have entered the necessary data, click on **"Proceed"** to continue.

SCREEN 3: First Responder Treatment at 10 Minutes



While the first two screens ask you to estimate a patient's signs and symptoms, Screen 3 addresses the second part of the IPDequation – treatment. The screen will once again display the patient's presenting signs and symptoms to give you an idea of the patient's condition. The goal of this portion is to provide your treatment suggestions for a patient 10 minutes after occurrence of the injury.

The drop-down menus work similarly to those found on Screens 1 and 2, with a few notable exceptions. First select a treatment or supply from a drop-down menu and then select the corresponding quantity. Once you have selected the items you find necessary for treatment, click on **"Add Selected Items."** If you do not deem any treatment necessary, simply click on **"No Treatment Necessary,"** and you will be taken to the next screen.

One important feature of note is that in order to add two or more items from the same drop-down menu, you will have to add them one at a time. To do this you must first pick one item from each of the desired categories and click on **"Add Selected Items."** You will then have the option to **"Add More Items."** Click

on this button and repeat the procedure until you have selected all the treatments and supplies you would like. The following table contains a list of all the treatments and supplies available; it is the same for each of the subsequent treatment screens.

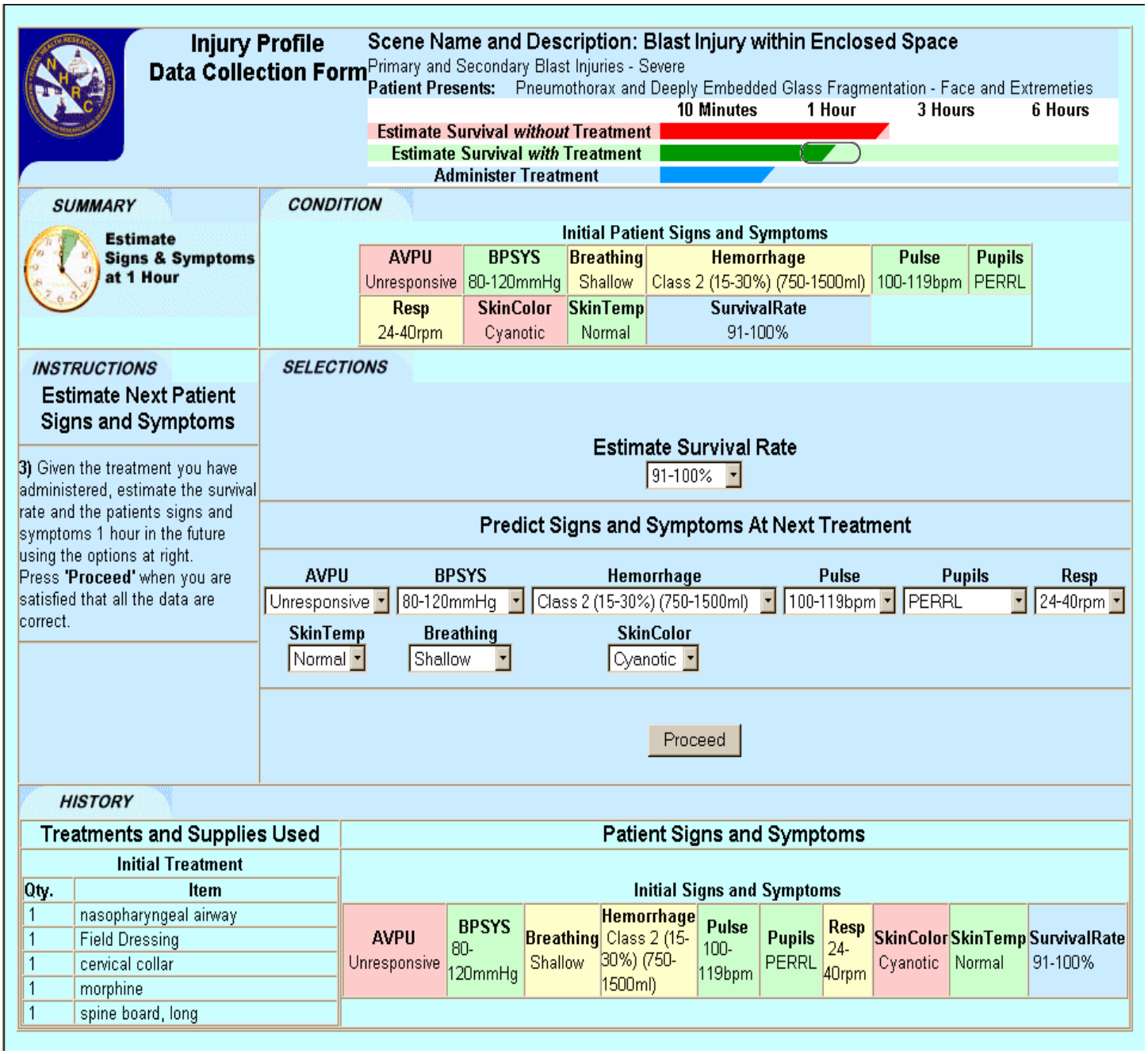
Airways	Bandages	Fluids	Immobilization	Medications	Procedures
Oropharyngeal Airway	Field Dressing	Ringers/Saline 1000cc	Cervical Collar	Albuterol	Pericardiocentesis
Nasopharyngeal Airway	Compression Bandage	Hetastarch 500cc	Spine Board, Long	Atropine	Suction (manual)
Intubate-(Endo-Trach Tube)	Kerlix™	Hypertonic Saline 7.5% 250cc	SAM Splint	Cefoxitin	Cricotyhroidotomy
Intubate-(Combitube)	Tourniquet	Hyp. Saline 7.5%-Dextran 70 250cc	Traction Splint	Ceftriaxone	Trachestomy
Chest Seal	Sponges 4x4		Sling	Diazepam	Stabilize Flail Rib Segment
Chest Tube	Water-gel Burn Dress		PASG Pelvic Stabilization	Dopamine	
Needle Thorocostomy	Vaseline Gauze			Epinephrine	
Bag Valve Mask	Coban Wrap™			Furosemide (Lasix)	
$ETCO_2$ sensor				Lidocaine	
Needle Cric Kit				Ketamine	
				Mannitol	
				Methylprednisolone	
				Morphine	
				Phenytoin	
				Sodium Bicarbonate	
				Sulfadiazine	
				Versed	

Once you have selected all the treatments and supplies you need, you will be taken to Screen 4. Screens 4 through 9 are all slight variations on either Screen 1 or Screen 3. An easy way to ensure that you know what you are expected to do is to ask yourself two questions:

1. Am I entering data for patient condition or patient treatment?
2. Has the patient received any treatment up to this point?

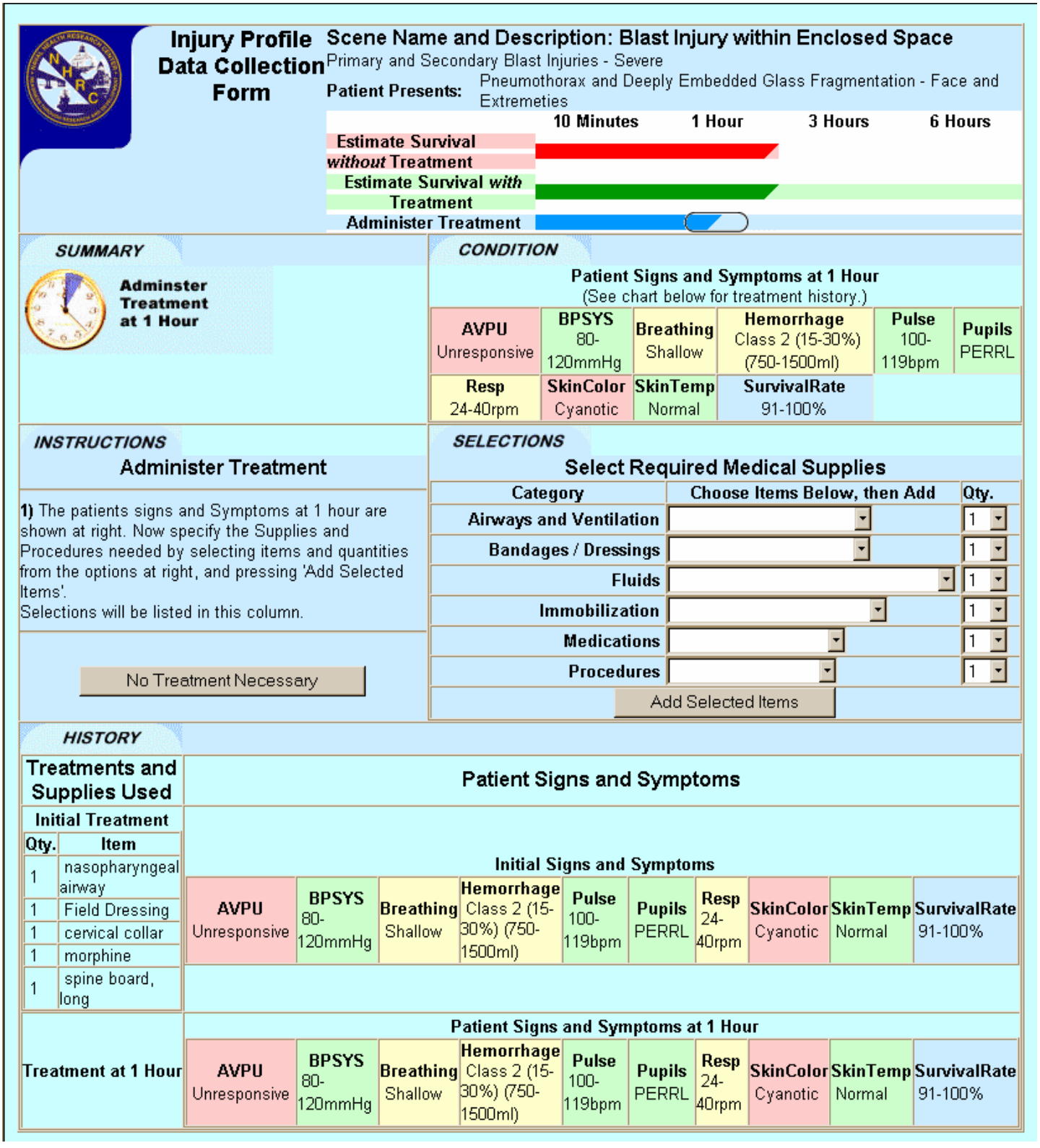
Both of these questions can be answered by referencing the title of each screen, found in the section marked “Summary” on the left-hand side of the screen.

SCREEN 4: Estimate Signs and Symptoms at 1 Hour, With Treatment



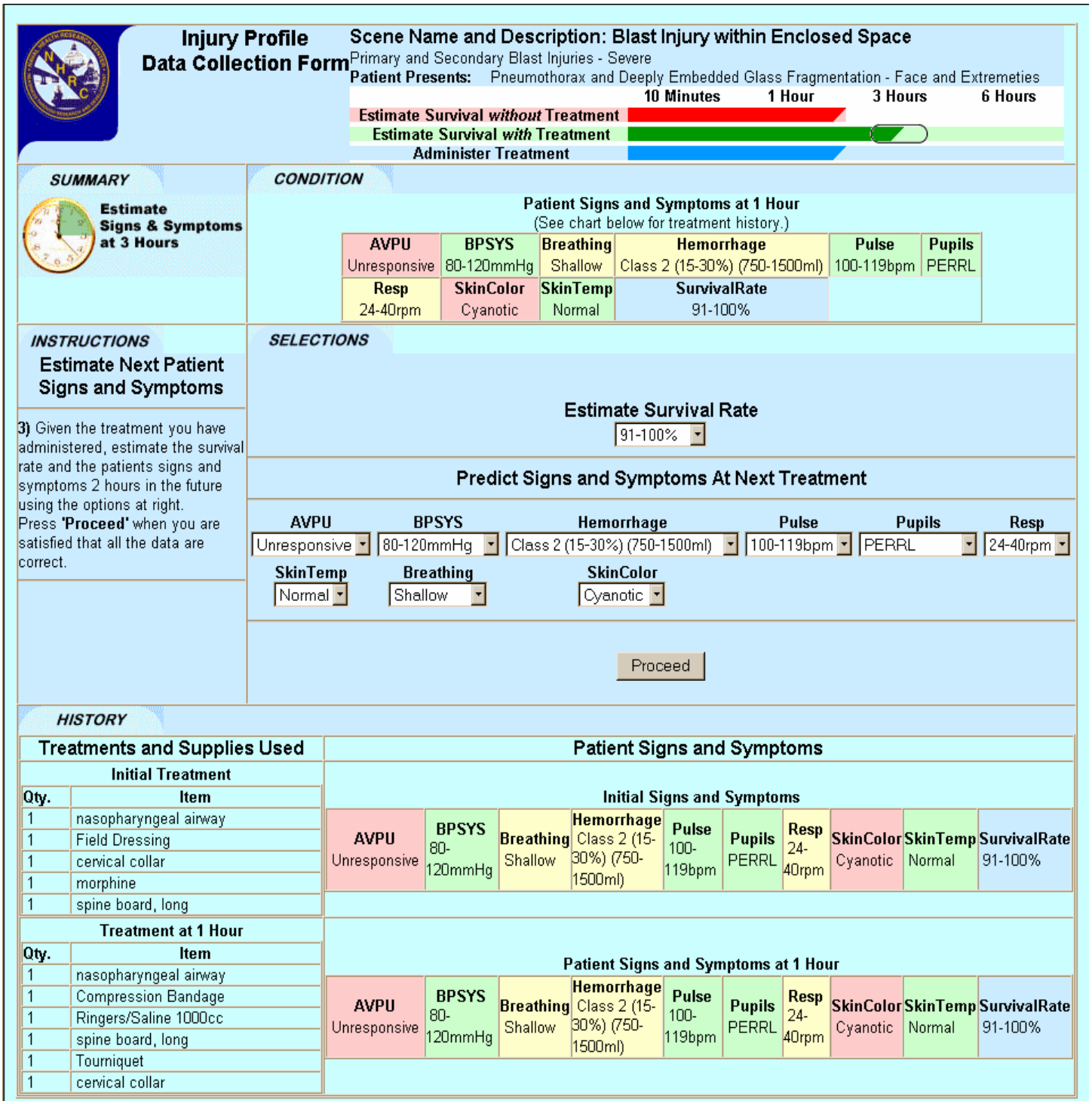
Screen 4 operates in the same manner as both Screens 1 and 2. The only differences of note are that the patient has received prior treatment and that the treatment is listed along with previous signs and symptoms at the bottom of the page. This list of previously administered treatments will continue to grow and be displayed at the bottoms of all the subsequent screens.

SCREEN 5: Administer Treatment at 1 Hour



This screen resembles Screen 3, except for the previously administered treatment found at the bottom of the page. Given that each of the following screens contain the same options as those explained earlier, all that follows is a snapshot of what each of these screens may look like. A final pointer for users is that if ever you become confused, just refer to the instructions in the left-hand column and if you want to access a category or value, just click on it.

SCREEN 6: Estimate Signs and Symptoms at 3 Hours, With Treatment



SCREEN 7: Administer Treatment at 3 Hours

Injury Profile Data Collection Form

Scene Name and Description: Blast Injury within Enclosed Space

Primary and Secondary Blast Injuries - Severe

Patient Presents: Pneumothorax and Deeply Embedded Glass Fragmentation - Face and Extremeties

	10 Minutes	1 Hour	3 Hours	6 Hours
Estimate Survival *without* Treatment				
Estimate Survival *with* Treatment				
Administer Treatment				

SUMMARY

Administer Treatment at 3 Hours

CONDITION

Patient Signs and Symptoms at 3 Hours

(See chart below for treatment history.)

AVPU	BPSYS	Breathing	Hemorrhage	Pulse	Pupils
Unresponsive	80-120mmHg	Shallow	Class 2 (15-30%) (750-1500ml)	100-119bpm	PERRL

Resp	SkinColor	SkinTemp	SurvivalRate
24-40rpm	Cyanotic	Normal	91-100%

INSTRUCTIONS

Administer Treatment

1) The patients signs and Symptoms at 3 hours are shown at right. Now specify the Supplies and Procedures needed by selecting items and quantities from the options at right, and pressing 'Add Selected Items'.
Selections will be listed in this column.

No Treatment Necessary

SELECTIONS

Select Required Medical Supplies

Category	Choose Items Below, then Add	Qty.
Airways and Ventilation		1
Bandages / Dressings		1
Fluids		1
Immobilization		1
Medications		1
Procedures		1

Add Selected Items

HISTORY

Treatments and Supplies Used

Initial Treatment

Qty.	Item
1	nasopharyngeal airway
1	Field Dressing
1	cervical collar
1	morphine
1	spine board, long

Patient Signs and Symptoms

Initial Signs and Symptoms

AVPU	BPSYS	Breathing	Hemorrhage	Pulse	Pupils	Resp	SkinColor	SkinTemp	SurvivalRate
Unresponsive	80-120mmHg	Shallow	Class 2 (15-30%) (750-1500ml)	100-119bpm	PERRL	24-40rpm	Cyanotic	Normal	91-100%

Treatment at 1 Hour

Qty.	Item
1	nasopharyngeal airway
1	Compression Bandage
1	Ringers/Saline 1000cc
1	spine board, long
1	Tourniquet
1	cervical collar

Patient Signs and Symptoms at 1 Hour

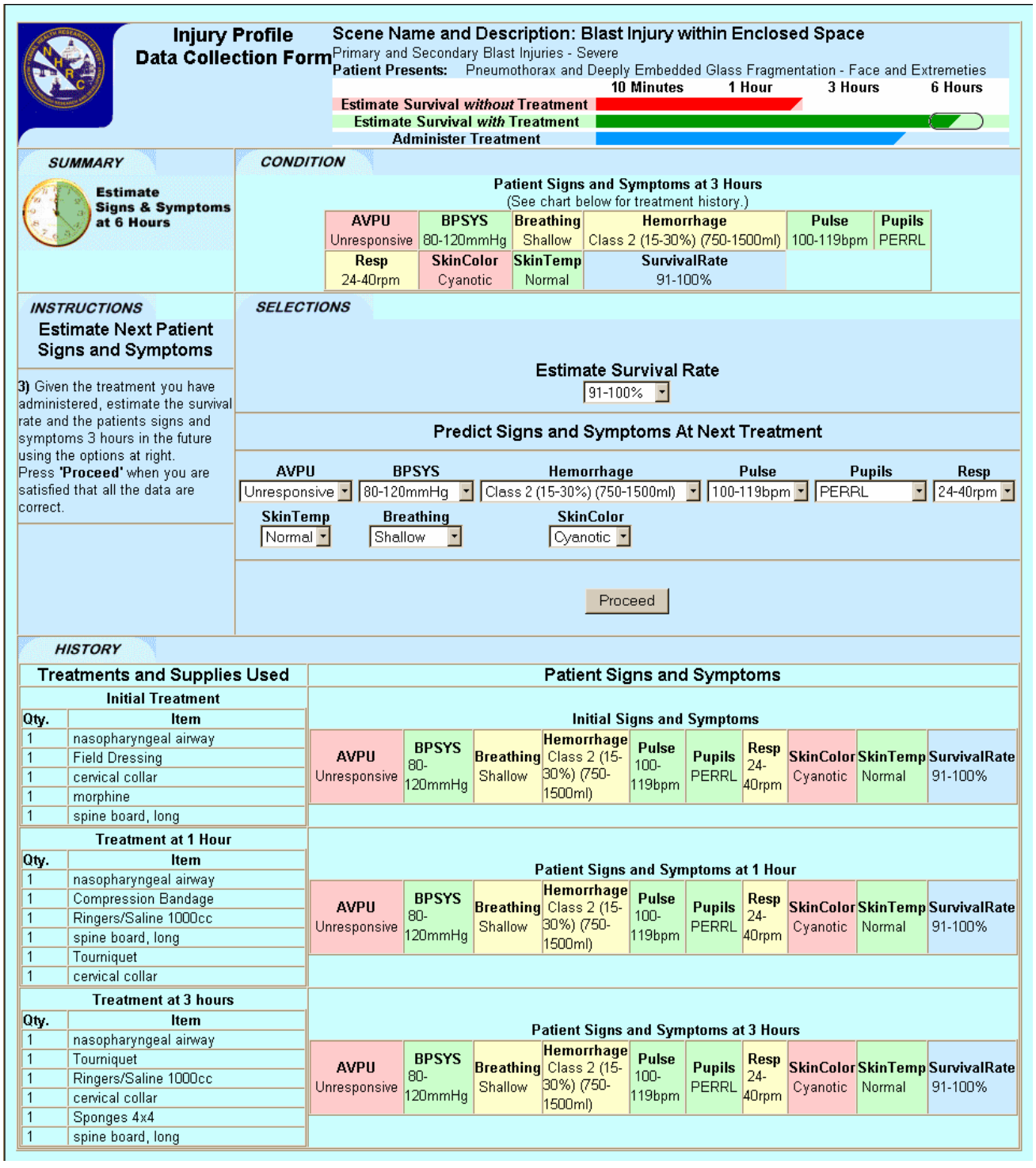
AVPU	BPSYS	Breathing	Hemorrhage	Pulse	Pupils	Resp	SkinColor	SkinTemp	SurvivalRate
Unresponsive	80-120mmHg	Shallow	Class 2 (15-30%) (750-1500ml)	100-119bpm	PERRL	24-40rpm	Cyanotic	Normal	91-100%

Treatment at 3 hours

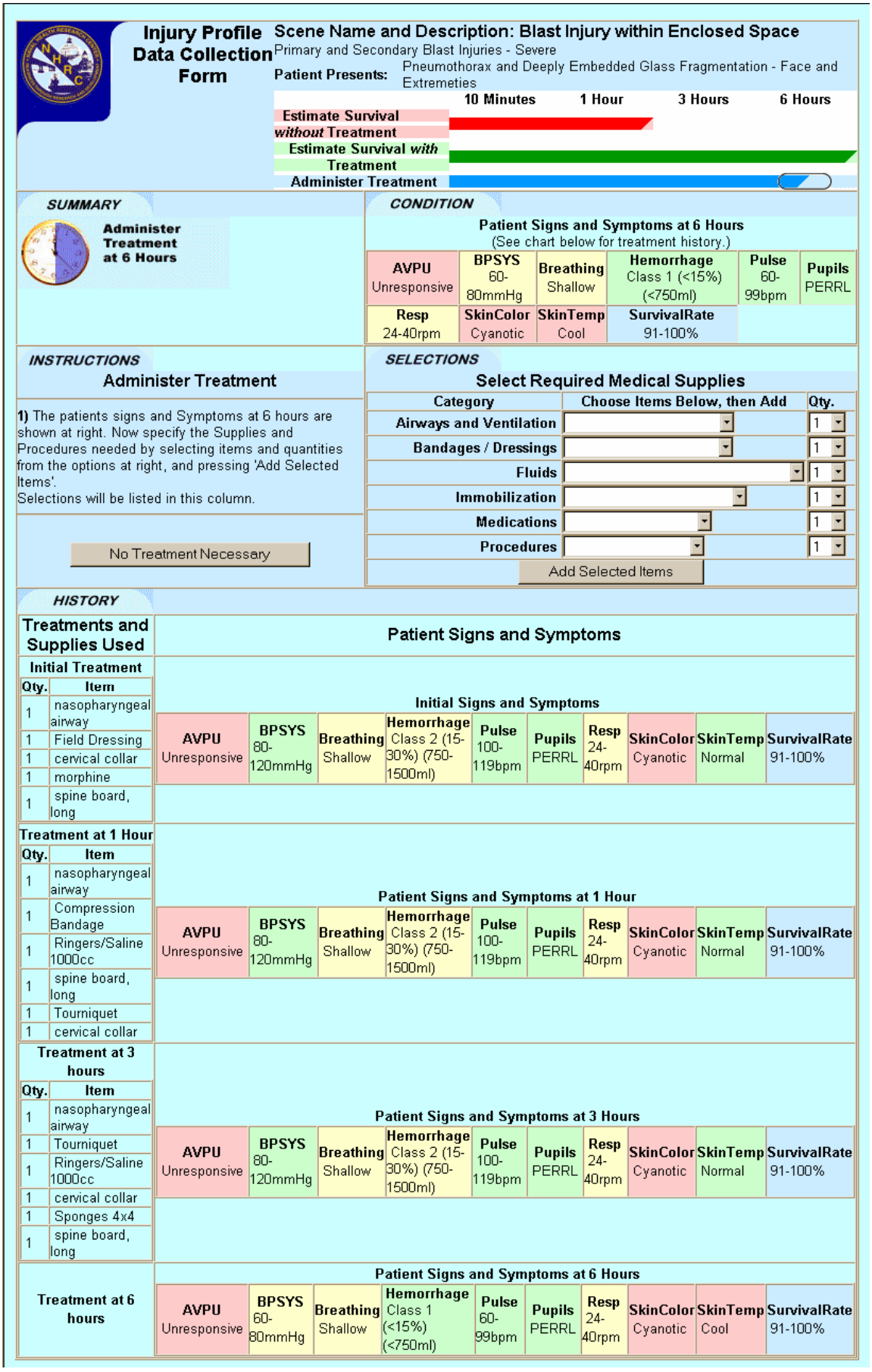
Patient Signs and Symptoms at 3 Hours

AVPU	BPSYS	Breathing	Hemorrhage	Pulse	Pupils	Resp	SkinColor	SkinTemp	SurvivalRate
Unresponsive	80-120mmHg	Shallow	Class 2 (15-30%) (750-1500ml)	100-119bpm	PERRL	24-40rpm	Cyanotic	Normal	91-100%

SCREEN 8: Estimate Signs and Symptoms at 6 Hours, With Treatment



SCREEN 9: Administer Treatment at 6 Hours



ADMINISTRATOR'S GUIDE

IPD ADMINISTRATIVE ACCESS

The first step in performing administrative functions related to the IPD is accessing the proper Web site. The Web address is http://nhrc-iat.rti.org/new/report.cfm. There are five different pages, and each serves a different administrative function. The pages are laid out rather simply and can be accessed via links at the top center of the any of the pages.

Following are the five pages that make up the IPD Administrative package:

1. View Reports (This is the page to which the above link leads. Clicking on it will refresh the page.)
2. Database Management
3. Edit Scenes
4. Define Symptoms
5. Define Treatments

View Reports

Since this is the first page you will come to, we will start here. View Reports contains a summary of all the data entered by students for each scene. There are eight sections on this page, and they appear in the following order under the heading, "Data Collection Status:"

1. Data Collection by Scene – Contains the total number of complete and incomplete forms for each scene.
2. Number of Cases for Each Student – Lists the number of forms filled out by each student for each scene.
3. Average Survival Probability Estimates by Scenario – A table that lists the mean survival probability estimate for each scene at each of the treatment times (i.e., 10 minutes, 1 hour, 3 hours, 6 hours, and 12 hours). A list underneath the table shows which students' estimates are included in the table and whether the student completed the form.
4. Survey Question Results – Provides all responses to an anonymous questionnaire that addresses the quality of the IPD.
5. Total Procedures and Supplies Used – Lists the name and quantity of every supply and procedure used at least once for all forms and scenes.
6. Procedures and Supplies Grouped by Individual Treatment Sequences – Lists the supplies and procedures used at each treatment interval for each case.
7. Procedures and Supplies Grouped by Scene and Treatment – A less specific table, this table displays the supplies and procedures used at each treatment interval for *all* cases.
8. Procedures and Supplies Grouped by Scene Only – The final section on View Reports, this table shows all procedures and supplies used for each scene. There is no distinction between students or treatment intervals.

The purpose of the View Reports page is to allow quick access to the data gathered up to the current time. To manipulate the data or view it in a spreadsheet form, however, you will need to move to the Database Management page.

Database Management

You can access the Database Management page by clicking on the link at the top of the page. Instructions for downloading the data to an Microsoft Excel spreadsheet are provided on the page. The downloading process will require that you take a snapshot of the View Reports page, and it may require you to download certain software for that purpose. All necessary download links are provided and will allow for the data to be updated periodically without taking a snapshot every time.

Edit Scenes

Clicking on the Edit Scenes link will send you to a page containing links for each of the scenes. To edit one of these scenes, simply click on the appropriate link. The next screen allows you to edit the scene name and description, presenting patient condition, and initial patient condition.

There are two particularly important things to keep in mind about this page. One is that in order to update all edited fields, you must click on both the **"Update Scene"** and the **"Record Initial Symptoms"** buttons before moving on. The other is that for students to enter data, the box marked "Enabled" must be checked. Students will not be able to access the proper Web site if this box is not checked.

Define Symptoms

This page allows you to edit or delete existing symptoms or add new symptoms to all cases. Simply click on the link at the top of any page and you will find the following options:

1. To **edit** a symptom, click on an existing symptom. From here, you can change the name of the symptom, edit values under that symptom, or add new values to the symptom. To edit a value, you will first be required to click on the appropriate value.
2. To **delete** a symptom, click on the existing symptom as though you intend to edit it. At the bottom of the page is an option to delete. Simply click on the **"Delete"** button and you will prompted to ensure that you do, indeed, wish to delete it.
3. To **add** a symptom, enter a new symptom in the text box under the heading "Enter New Symptom Category" and click on **"Add New Symptom."** Once this is done you will be able to add and edit values in the same way as if you were editing an existing symptom.

Define Treatments

The Define Treatments page works in essentially the same manner as the Define Symptoms page. To edit an existing treatment, simply click on the desired treatment and edit, add, or delete the various values.

Summary

The IPDAdministrative functions are intended to be quick to learn and user-friendly. Most pages have instructions included for any portions that might be confusing. Keep in mind that the easiest way to edit any of the categories or values is to click on the item.

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Matthew Knapp & Mike Galarneau

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Naval Health Research Center
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14. ABSTRACT (maximum 200 words)

The fundamental effectiveness of any modeling and simulation projection tool is dependent upon the quality of the underlying data. The Naval Health Research Center has historically used three primary sources of data to support its projection tools. These include historical analysis of past events and archival records, the scientific literature, and subject matter experts (SMEs). The third data source, SMEs, is used when the data are unavailable either historically or in the scientific literature. In these circumstances, SMEs are assembled, and a particular area of knowledge is discussed by the group. The primary objective of these efforts is to extract knowledge from the collective body of training and experience of the SMEs, and to reach consensus on the discussion issues. These consensus-based subject areas are then organized into databases, and incorporated into projection tools. This process, however, is time-consuming and costly. The current study was undertaken to address this issue. In an effort to develop a more efficient SME consensus-building approach, an Internet-based application was developed that would preclude the necessity of gathering SMEs in a single location to collect required data sets. In this approach, an application, named the Injury Profile Developer (IDP), was created. The IPD was created to allow SMEs to sign-on to a PC at a time and place of their choosing. In this application, users are presented with a description of a simulated combat casualty, and asked to administer simulated field-level treatments, adjust casualty signs, and symptoms, and project probabilities of survival at five simulated points in time along a 12-hour continuum of time. To assist SMEs in the use of the IPD, a user's guide describing the application and how to use it was prepared.

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